

### **REMARKS**

In the Office Action, claims 1-40 were rejected. By the present Response, claims 1, 5, 9, 13, 17, 21, 25, 29, 33 and 37 are amended. Upon entry of the amendments, claims 1-40 will remain pending in the present patent application. Reconsideration and allowance of all pending claims are requested.

#### **Amendments to the Specification**

In the Office Action, the Examiner objected to various informalities in the specification. The specification has been amended to address these informalities. With regard to the replacement paragraph provided for page 1, line 21, the Applicants note that support for this amendment is found elsewhere in the specification, such as at page 8, lines 5-8. Therefore, correction of this passage in the background is not believed to introduce new matter.

#### **Double Patenting**

The Examiner provisionally rejected claims 1-40 on the ground of nonstatutory obviousness-type double patenting as being unpatentable over claims 1-32 of copending Application No. 10/723,894 in view of U.S. Patent Publication 2004/0155653 (the “Larson reference”). As neither the copending application nor the present application have issued, and thus no issued claims are purported to be in conflict, the Applicants do not believe that a response is currently needed. The Applicants maintain the right to respond to the assertion of obviousness-type double patenting between the cited copending applications once one of the copending applications matures into an issued patent.

#### **Claim Objections**

The Examiner characterized the claims as belonging to two groups with Group I including claims 5-8, 13-16, 21-24, 29-32, and 37-40 and Group II including claims 1-4, 9-12, 17-20, 25-28, and 33-36. Based on these groupings, the Examiner objected to the

claims of Group I as being substantial duplicates of the claims of group II. In particular, the Examiner stated that: “[t]he steps and features recited in the claims of group I for reconstructing image data are considered obvious over the embodiments recited in the claims of group II. It is known in the art that raw MR k-space signal data is not useful unless it is reconstructed into temporal domain data in order to extract pertinent temporal and spatial data for creating an image, and methods for such reconstruction are also well-known in the art.” Office Action, p. 3.

The Applicants traverse this objection and respectfully request the Examiner’s reconsideration. In particular, the Applicants categorically reject the Examiners characterization of the present claims and the Examiner’s misguided application of an obviousness-type analysis between copending claims. As the Examiner will appreciate, the issue is not whether one of ordinary skill would know how to reconstruct an image from raw signal data. The Applicant’s proper concern is that the presently recited techniques might be applied to either unprocessed or processed (such as reconstructed), image data. As the Applicants have disclosed and explained how the present techniques might be applied to either raw or processed image data, the Applicants are entitled to claims that protect both types of implementations. The Examiner appears to be improperly attempting to limit the Applicants ability to fairly claim all that the Applicants have disclosed, to the Applicants peril.

Indeed, unless the Examiner can unequivocally state that the claims which the Examiner characterizes as belonging to Group II can be effectively applied to a potential infringer who uses the disclosed techniques to process unreconstructed data, then it is improper for the Examiner to maintain the present objection. Likewise, unless the Examiner can unequivocally assure the Applicants that a court would interpret the language of the claims of group II to encompass both unprocessed and processed image data, it would be improper for the Examiner to maintain the present objection. Clearly the Examiner can offer no such assurances. Indeed, the Examiner’s present objection

appears to be designed to force the Applicants to forego protection of certain implementations of their technique, without any guarantee or assurance that the remaining claims would be interpreted by a court as covering the subject matter in question. In view of the clear impropriety of the present objection, the Applicants respectfully request reconsideration and withdrawal of the present objection.

**Rejections Under 35 U.S.C. § 101**

In the Office Action, the Examiner rejected claims 1, 5, 9, 13, 17, 21, 25, 29, 33 and 37 under U.S.C. § 101 as being directed to non-statutory subject matter. Office Action, p. 4. Applicants respectfully traverse this rejection.

***Legal Precedent***

According to the Supreme Court, Congress intended statutory subject matter to “include anything under the sun that is made by man.” *Diamond v. Chakrabarty*, 447 U.S. 303, 308-09; 206 U.S.P.Q. 193, 197 (1980). Indeed, exclusions of statutory subject matter are limited to laws of nature, natural phenomena and abstract ideas. *See Diamond v. Diehr*, 450 U.S. 175, 185; 209 U.S.P.Q. 1, 7 (1981). Other than these specific exceptions, therefore, nearly anything man made is statutorily patentable subject matter under 35 U.S.C. §101.

In determining when process or method claims include statutory subject matter, the Supreme Court in *Diehr* stated that “[t]ransformation and reduction of an article ‘to a different state or thing’ is the clue to the patentability of a process claim that does not include particular machines.” *See id.* 450 U.S. at 183-185, 209 U.S.P.Q. at 6. In addition to the Supreme Court’s transformation and reduction test, the Federal Circuit has developed a second test which may also be used to determine if a claim recites statutory subject matter, namely does the claim produce a “useful, concrete, and tangible result.” *In re Alappat*, 31 U.S.P.Q.2d 1545, 1557 (Fed. Cir. 1994) (*en banc*). The Federal Circuit further elaborated on this second test by holding that one must look to “the essential

characteristics of the subject matter, in particular, its practical utility.” *State Street Bank & Trust Co. v. Signature Financial Group Inc.*, 47 U.S.P.Q.2d 1596, 1602 (Fed. Cir. 1998).

However, explaining this “useful, concrete, and tangible” test, the Federal Circuit has stated “the dispositive inquiry is whether the claim *as a whole* is directed to statutory subject matter.” *In re Alappat*, 31 U.S.P.Q.2d at 1557 (emphasis in original). Indeed, there has been no requirement from Congress, the Supreme Court, or the Federal Circuit mandating that a *specific final result* be shown for a claim to qualify under Section 101. *See id.* Rather, the Federal Circuit has specifically stated “the *Alappat* inquiry simply requires an examination of the contested claims to see if the claimed subject matter *as a whole* is a disembodied mathematical concept representing nothing more than a ‘law of nature’ or an ‘abstract idea,’ or if the mathematical concept has been reduced to *some practical application rendering it ‘useful’*.<sup>1</sup>” *AT&T Corp. v. Excel Communications, Inc.*, 50 U.S.P.Q.2d 1447, 1451 (Fed. Cir. 1999) (emphasis added). Therefore, if a claim meets either the transformation and reduction test put forth by the Supreme Court, or if the claim, read as a whole and in light of the specification, produces any useful, concrete, and tangible result, the claim meets the statutory requirements of Section 101. *See id.*

Applicants respectfully assert that the independent claims 1, 5, 9, 13, 17, 21, 25, 29, 33 and 37, taken as a whole, each recite statutory subject matter under 35 U.S.C. §101 because they produce a useful, concrete and tangible result. The present Application is generally directed to determining the overall motion of an organ of interest using sensor-based and/or image data-based techniques. *See Abstract.* For example, the present application discloses methods extracting prospective and retrospective gating points and/or motion compensation factors for processing image data, either prior or subsequent to reconstruction. *See Specification*, p. 19, line 217 to p. 20, line 9; p. 21, line 1 to p. 22, line 19. The result of the processing steps may be an image of an organ in which motion-related artifacts are substantially reduced. *See Id.* and *Abstract.*

Accordingly, independent claims 1, 9, 17, 25, and 33 recite generally the acts of: processing a set of motion data to extract two or more prospective gating points and two or more retrospective gating points for an organ of interest, acquiring a set of image data representative of the organ of interest using the two or more prospective gating points, processing a portion of the set of image data based upon the two or more retrospective gating points, and displaying or storing an image generated from the portion of the set of image data.” Independent claims 5, 13, 21, 29 and 37 recite generally the acts of: processing the set of motion data to extract two or more prospective gating points and two or more retrospective gating points for an organ of interest, acquiring a set of image data representative of the organ of interest using the two or more prospective gating points, reconstructing the set of image data to generate a set of reconstructed data, processing a portion of the set of reconstructed data based upon the two or more retrospective gating points, and displaying or storing an image generated from the portion of the set of reconstructed data.”

Each claim, therefore, taken as a whole, recites a method for imaging an organ using both prospective and retrospective gating points whereby a useful image is generated and stored or displayed. Applicants assert that the stored or displayed image is a useful, concrete and tangible result. For example, the image may be used in treating patients, such as for planning therapeutic procedures and so forth, or for diagnosing patients. Accordingly, Applicants respectfully request withdrawal of the rejection of independent claims 1, 5, 9, 13, 17, 21, 25, 29, 33 and 37 under 35 U.S.C. §101.

#### **Rejections Under 35 U.S.C. § 102**

The Examiner rejected claims 1-8, 17-24, and 33-40 under 35 U.S.C. § 102(e) as anticipated by U.S. Patent Publication 2004/0155653 (the “Larson reference”). A *prima facie* case of anticipation under 35 U.S.C. § 102 requires a showing that each limitation of a claim is found in a single reference, practice or device. *In re Donohue*, 226 U.S.P.Q.

619, 621 (Fed. Cir. 1985). Independent claims 1-8, 17-24, and 33-40 are believed to distinguish over the Larson reference. Therefore, the Applicants respectfully traverse the present rejection and request reconsideration by the Examiner.

*Independent Claims 1-8 and 17-24*

With regard to independent claims 1-8 and 17-24, the claims generally recite the extraction of both prospective and retrospective gating points, the acquisition of image data using the prospective gating points, and the processing of a portion of a set of image data (or reconstructed image data) based upon the retrospective gating points. Contrary to the Examiner's analysis, the Larson reference teaches the use of prospective or retrospective synchronization, not the use of both in a single implementation, as presently recited. *See* Larson, paragraphs 5, 19, 50-52. Indeed, it appears to be clear from these passages of the Larson reference that the Larson reference neither discloses nor contemplates the acquisition of image data with prospective gating and the processing of the processing of the acquired image data using retrospective gating. *Id.* In view of this deficiency, in addition to the deficiencies noted above, no *prima facie* case of anticipation is believed to exist for independent claims 1-8.

Applicants also wish to respectfully note that the Examiner's equation of the recited electrical sensor data with imaging data is clearly in error. Office Action, p. 4. The Larson reference generally describes the use of image-based techniques to derive motion data. Office Action p. 4; Larson, Abstract, paragraphs 10, 14, 25, and 35. As clearly set forth in the present application, the acquisition of motion data using sensor-based techniques is distinct from those techniques that utilize the image data itself. Application, Figs 1 and 2, p. 11, line 13 to p. 12, line 4; *see also* p. 12, line 6 to p. 16, line 2. In view of the clear distinction drawn between image-based and sensor-based techniques for measuring motion as set forth in the specification, no reasonable construction of claims 1-8 and 17-24 based on the specification could interpret the recited

sensor-based approaches to encompass techniques where motion data is acquired from the image data, as generally disclosed in the Larson reference.

In addition, Applicants also wish to point out that independent claims 4, 8, 20, and 24 are properly formulated so as to invoke the presumption that they are to be interpreted in view of 35 U.S.C. § 112, paragraph 6 as “means-plus-function” type claims. As such, the rejection of these claims should be provided in accordance with M.P.E.P. §§ 2181-2183. Currently no such analysis or rejection has been provided. As the present rejection is insufficient to meet the guidance imposed by the M.P.E.P., the Applicants respectfully note that it would be improper to make a succeeding rejection of these claims final as the Applicants has not been afforded an opportunity to respond to a proper rejection of these claims when properly constructed and analyzed in accordance with 35 U.S.C. § 112, paragraph 6.

*Independent Claims 33-40*

Independent claims 33-40 are believed to be allowable fro the reasons described above with regard to claims 1-8 and 17-24, namely the failure of the Larson reference to describe the concurrent use of prospective and retrospective gating.

In addition, the Applicants note that claims 33-40 recite the derivation and use of motion compensation factors in addition to prospective and retrospective gating points. Such motion compensation factors are discussed in the present application at Figs. 4 and 8 and at p. 19, lines 17-27 as well as elsewhere. As presently recited in claims 33-40 and as described in the application, the motion compensation factors are distinct from the gating points, either prospective or retrospective. *Id.*

The Examiner’s analysis, however, appears to confound the disclosure of synchronization in the Larson reference with the separate subject matter of motion compensation factors, as presently recited. As the Examiner will surely appreciate, the

use of “synchronization” techniques allow the selection of like windows of image data that may be undergoing a similar phase of motion. Such synchronization, however, does not guarantee that the object undergoing motion moves exactly the same way, manner, or degree through each iteration of the motion. In other words, there may still be motion-based differences even for image data acquired at the same “phase” of motion for a moving object. The presently described and recited motion compensation factors may address such “intraphase” motion variation. The Larson reference, however, appears to be devoid of such motion compensation factors and instead appears to only address the synchronization issue. If, however, the Examiner wishes to maintain the present formulation whereby the synchronization of the Larson reference is equated with the presently recited motion compensation factors, the Applicants respectfully request that the Examiner cite with specificity to the Larson reference to point out what aspect of the Larson reference corresponds to prospective and retrospective gating points as these would then presumably not be the prospective and retrospective synchronization of the Larson reference. In view of this deficiency, in addition to the deficiencies noted above, no *prima facie* case of anticipation is believed to exist for independent claims 33-40.

In addition, Applicants also wish to point out that independent claims 36 and 40 are properly formulated so as to invoke the presumption that they are to be interpreted in view of 35 U.S.C. § 112, paragraph 6 as “means-plus-function” type claims. As such, the rejection of these claims should be provided in accordance with M.P.E.P. §§ 2181-2183. Currently no such analysis or rejection has been provided. As the present rejection is insufficient to meet the guidance imposed by the M.P.E.P., the Applicants respectfully note that it would be improper to make a succeeding rejection of these claims final as the Applicants has not been afforded an opportunity to respond to a proper rejection of these claims when properly constructed and analyzed in accordance with 35 U.S.C. § 112, paragraph 6.

**Rejections Under 35 U.S.C. § 103**

The Examiner rejected claims 9-16 and 25-32 under 35 U.S.C. § 103(a) as being unpatentable over the Larson reference in view of U.S. Patent No. 5,477,144 (the “Rogers reference”). The burden of establishing a *prima facie* case of obviousness falls on the Examiner. *Ex parte Wolters and Kuypers*, 214 U.S.P.Q. 735 (PTO Bd. App. 1979). Obviousness cannot be established by combining the teachings of the prior art to produce the claimed invention absent some teaching or suggestion supporting the combination. *ACS Hospital Systems, Inc. v. Montefiore Hospital*, 732 F.2d 1572, 1577, 221 U.S.P.Q. 929, 933 (Fed. Cir. 1984). Accordingly, to establish a *prima facie* case, the Examiner must not only show that the combination includes *all* of the claimed elements, but also a convincing line of reason as to why one of ordinary skill in the art would have found the claimed invention to have been obvious in light of the teachings of the references. *Ex parte Clapp*, 227 U.S.P.Q. 972 (B.P.A.I. 1985). When prior art references require a selected combination to render obvious a subsequent invention, there must be some reason for the combination other than the hindsight gained from the invention itself, i.e., something in the prior art as a whole must suggest the desirability, and thus the obviousness, of making the combination. *Uniroyal Inc. v. Rudkin-Wiley Corp.*, 837 F.2d 1044, 5 U.S.P.Q.2d 1434 (Fed. Cir. 1988). One cannot use hindsight reconstruction to pick and choose among isolated disclosures in the prior art to deprecate the claimed invention. *In re Fine*, 837 F.2d 1071, 5 U.S.P.Q.2d 1596 (Fed. Cir. 1988). Independent claims 9-16 and 25-32 are believed to distinguish over the combination of the Larson and Rogers references. Therefore, the Applicants respectfully traverse the present rejection and request reconsideration by the Examiner.

With regard to independent claims 9-16 and 25-32, the claims generally recite the extraction of both prospective and retrospective gating points, the acquisition of image data using the prospective gating points, and the processing of a portion of a set of image data (or reconstructed image data) based upon the retrospective gating points. As noted above, the Larson reference teaches the use of prospective or retrospective

synchronization, not the use of both in a single implementation, as presently recited. *See* Larson, paragraphs 5, 19, 50-52. Indeed, it appears to be clear from these passages of the Larson reference that the Larson reference neither discloses nor contemplates the acquisition of image data with prospective gating and the processing of the processing of the acquired image data using retrospective gating. *Id.*

Such use of prospective and retrospective gating also appears to be absent from the Rogers reference. Instead the Rogers reference generally describes the generation of signal corrections that are intended to correct for uneven sampling intervals that can inadvertently modulate the acquired image signal. *See, for example,* Rogers, col. 1, lines 33-40, col. 2, lines 55-59, 66-67, col. 3, lines 16-17, 28-31, 46-47, col. 4, lines 25-28, 41-49, and col. 6, lines. The Rogers reference, however, appears to be devoid of any mention of using both retrospective and prospective gating techniques in a single implementation and, thus, does not obviate the deficiencies of the Larson reference. In view of this deficiency, no *prima facie* case of obviousness is believed to exist for independent claims 9-16 or 25-32.

Further, Applicants also wish to point out that independent claims 12, 16, 28, and 32 are properly formulated so as to invoke the presumption that they are to be interpreted in view of 35 U.S.C. § 112, paragraph 6 as “means-plus-function” type claims. As such, the rejection of these claims should be provided in accordance with M.P.E.P. §§ 2181-2183. Currently no such analysis or rejection has been provided. As the present rejection is insufficient to meet the guidance imposed by the M.P.E.P., the Applicants respectfully note that it would be improper to make a succeeding rejection of these claims final as the Applicants has not been afforded an opportunity to respond to a proper rejection of these claims when properly constructed and analyzed in accordance with 35 U.S.C. § 112, paragraph 6.

**General Authorization for Extensions of Time**

In accordance with 37 C.F.R. § 1.136, Applicants hereby provide a general authorization to treat this and any future reply requiring an extension of time as incorporating a request therefor. Furthermore, Applicants authorize the Commissioner to charge the appropriate fee for any extension of time to Deposit Account No. 07-0845; Order No. GEMS:0263/YOD/RAR (132958XX-D).

**Conclusion**

In view of the remarks and amendments set forth above, Applicants respectfully request allowance of the pending claims. If the Examiner believes that a telephonic interview will help speed this application toward issuance, the Examiner is invited to contact the undersigned at the telephone number listed below.

Respectfully submitted,

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